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Small Mammal Populations on the Kenai Peninsula, Alaska

Abstract

During May to September 1974, 298 small mammals of six species (two soricids and four microtines) were captured during 34,609 trapnights (8.6 mammals/1000 tn) on the Kenai National Moose Range, Alaska. Capture success increased sixfold with increases in elevation and ninefold through the summer. Compared with studies in other years, capture success was low in all areas. Timberline areas had greatest species diversity; several species were limited in geographic distribution. Five additional species potentially or known to be present were not captured.

Introduction

The occurrence of fluctuations in small mammal populations in North America has been well documented (Krebs and Meyers, 1974). The ecological and geographic distribution of some sympatric or adjacent populations of soricids and microtines has also been reported (Getz, 1961; Brown, 1967). Studies were conducted during May to September 1974 to determine the relative abundance and distribution of small mammals on the Kenai National Moose Range, Alaska. This paper reports on the apparent population fluctuations occurring there in recent years, and the influence of elevation on relative numbers and distribution.

Study Area

The Moose Range is located in the northwestern part of the Kenai Peninsula on the southcentral coast of Alaska (Fig. 1). The Range is bounded by Cook Inlet on the north and west, and the Kenai Mountains (up to 2000 m above sea level) on the south and east. The area is characterized by two distinct physiographic features: the forested, lake-dotted lowlands, and the treeless benches and mountains.

The vegetation in the lowlands, which comprise the northwestern two-thirds of the Range, varies from black spruce (*Picea mariana*) muskegs to climax white spruce (*P. glauca*); birch (*Betula spp.*), aspen (*Populus tremuloides*), balsam poplar (*P. balsamifera*), and willows (*Salix* spp.) are present as pure stands or mixed with spruce. Common understory species include alder (*Ainus crispa*), *Vaccinium* spp., fireweed (*Epilobium angustifolium*), bunchberry (*Cornus canadensis*), crowberry (*Empetrum nigrum*), willow, and *Sphagnum* spp. Parts of the lowland area have burned in recent years (1250 km^2 in 1947 and 350 km^2 in 1969) and are in varying stages of succession. In the treeless alpine tundra areas, common vegetation includes dwarf birch (*B. glandulosa*), bearberry (*Arctostaphalus uva-ursi*), blueberry and willow, and alder near lakeshores.

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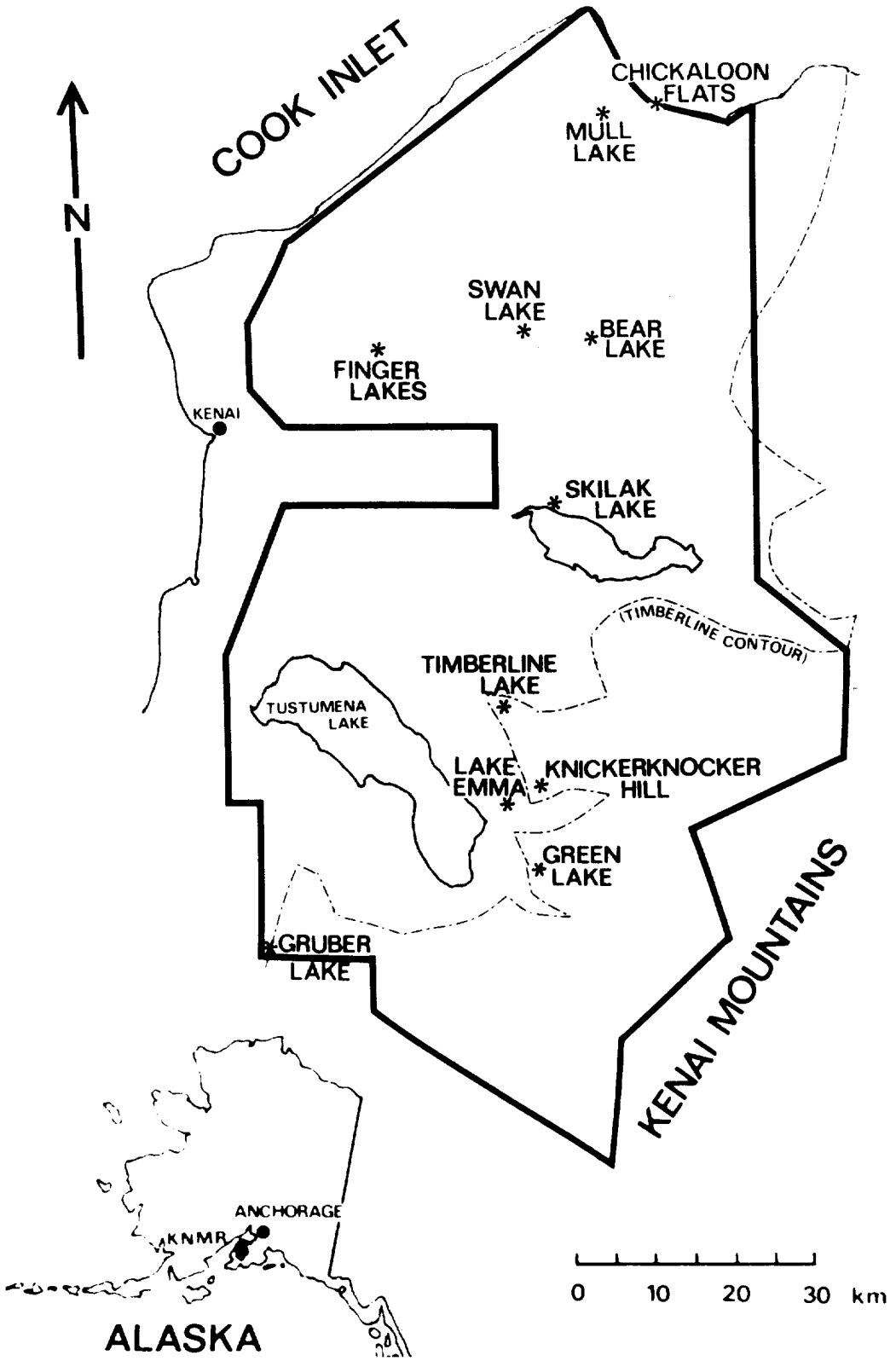

Figure 1. Locations on the Kenai National Moose Range, Alaska, where trapping for small mammals was conducted 18 May-24 September 1974.

The mean elevation of six lowland study areas is 74 m (range 3-121 m). Part of the Finger Lakes area (Fig. 1) is in the 1969 burn, and parts of both the Bear Lake and Swan Lake areas are in the 1947 burn. Much of the Mull Lake area is located in virgin birch-spruce forest; the Chickaloon Flats encompass an unburned island-tidal area, and the Skilak Lake area is in mature aspen and spruce forests. The elevation of the three alpine tundra study areas, Green Lake, Timberline Lake, and Knickerknocker Hill, averages 662 m (range 472-848 m). The other two study areas, Lake Emma and Gruber Lake, average 424 m in elevation (range 318-530 m), and include areas at or to 200 m below timberline.

Methods

Each study area was investigated for seven to fourteen days; four areas (Finger Lakes, Swan Lake, Skilak Lake, and Timberline Lake) were investigated twice. During May and June, small mammal capture attempts were made with about 250 snap traps (mostly Museum Specials, but also a few Victor mouse and rat traps), and 250 Sherman folding live traps. With the acquisition of an additional 250 Museum Special traps in late June, such traps were used exclusively from July through September. Traps were baited with a mixture of peanut butter and bacon grease. They were spaced approximately 8 m apart and set out in lines of 30 each. Lines were placed in representative habitat types where prospects for capture success looked promising. Traps were checked each morning, and lines moved to new areas every two to four days. As many forest types as possible were sampled in each area.

The skins, skulls, and reproductive tracts of captured animals were saved, and weights and body measurements recorded. Species were identified by skull, pelage, and body characteristics (Hall and Kelson, 1959).

Results

Six species of small mammals were captured from 18 May to 4 September 1974: vagrant shrew (*Sorex vagrans*), masked shrew (*S. cinereus*), singing vole (*Microtus miurus*), tundra vole (*M. oeconomus*), northern red-backed vole (*Clethrionomys rutilus*), and northern bog lemming (*Synaptomys borealis*). A total of 298 captures was made during 34,609 trapnights, an average of 8.6 individuals/1000 trapnights (Table 1). Red-backed voles were most commonly caught (3.9/1000 trapnights); vagrant shrews and bog lemmings were captured least often (0.1/1000 trapnights).

Significant differences in the relative number of animals caught were noted with respect to both elevation and time of year (Table 1). During July and August relatively twice as many individuals of all species were captured in timberline areas than in lowland forest areas, and more than six times as many were caught in alpine tundra areas. Differences in capture success for each species were most notable in alpine tundra as opposed to other areas. In addition, lowland areas trapped during July-August and September yielded four and nine times, respectively, the number of individuals captured per 1000 trapnights there during May-June.

Timberline areas produced the greatest species diversity; all six species were found there (Table 1). No vagrant shrews or bog lemmings were found in alpine tundra areas, and no bog lemmings and only one *Microtus* were taken from lowland forest areas. Red-backed voles were common in all areas, as were masked shrews.

TABLE 1. Capture success and distribution of six small mammal species trapped on the Kenai National Moose Range, Alaska, during 18 May to 4 September 1974. Range of capture success shown in parentheses.

Habitat	Months	Study areas[a]	No. of each species captured[b]							No. of trapnights	Total no. of captures/ 1000 trapnights
			S.v.	S.c.	M.m.	M.o.	C.r.	S.b.	Total		
Lowland forest	May-Jun	Fn,Be,Sw,Fn,Sw,Sk					17		17	16,037	1.1(0.0-2.2)
	Jul-Aug	Fn,Sw,Sk	3	9		1	16		29	6,103	4.8(2.9-6.3)
	Sep	Sk		1			12		13	1,261	10.3
Timberline	Jul-Aug	Em,Gr	1	6	16	23	13	5	64	5,390	11.9(10.4-13.8)
Alpine tundra	Jul-Aug	Gn,Tm,Kn,Tm		16	19	64	76		175	5,818	30.1(2.1-61.1)
		Total	4	32	35	88	134	5	298	34,609	8.6

[a]Fn—Finger Lakes; Be—Bear Lake; Sw—Swan Lake; Mu—Mull Lake; Ch—Chickaloon Flats; Sk—Skilak Lake; Em—Lake Emma; Gr—Gruber Lake; Gn—Green Lake; Tm—Timberline Lake; Kn—Knickerknocker Hill.

[b]**S.v.—Sorex vagrans; S.c.—Sorex cinereus; M.m.—Microtus miurus; M.o.—Microtus oeconomus; C.r.—Clethrionomys rutilus; S.b.—Synaptomys borealis.**

Discussion

Small mammals were apparently very abundant on the Moose Range during summer 1973, judging from the number of inquiries concerning "mouse" damage made to the Moose Range staff, and the observations of naturalists and outfitters in the area (J. Monnie and B. Schaeffer, pers. comm.). Thus, it seems likely that a population crash occurred during winter 1973-74; this hypothesis was reflected in the low number of animals caught in summer 1974. Data from other researchers indicate the relative abundance of small mammals in lowland forest areas on the Peninsula in other years. Trap success near Finger Lakes in 1970 ranged from 31-83/1000 trapnights (Ellison, 1970). During summers 1977 and 1978, Bangs (1979) averaged 89 captures/1000 trapnights in vegetationally disturbed and undisturbed sites; success varied from 66-103/1000 trapnights. Compared to our unweighted mean capture success for May-September of 5.4/1000 trapnights in lowland areas, these values reflect a six- to sixteenfold difference. This magnitude of change has been reported elsewhere for a red-backed vole population (Patric, 1962), and is not uncommon for microtines (Krebs and Meyers, 1974).

Seasonal increases in small mammal numbers are to be expected. The initiation of reproduction in spring and continued recruitment through summer would most obviously be involved. Also, change in trap type may have contributed to an increased number of captures in lowland areas after June.

Altitudinal differences in trapping success most likely reflected differences in habitat quality and/or quantity, and thus carrying capacity. However, these differences may also reflect cycle asynchrony of allopatric populations.

Bangs (1979) found, as we did, that red-backed voles and masked shrews were the dominant species in lowland forest areas. He also captured several bog lemmings and vagrant shrews there, as well as two species we did not capture: meadow voles (*Microtus pennsylvanicus*) and pygmy shrews (*Microsorex hoyi*). That no singing or tundra voles were captured in lowland areas concurs with our data. The absence of meadow voles in our sample may reflect the presumably low population in 1974, combined with low trapping effort in grassy areas in which *M. pennsylvanicus* might have been more abundant. With regard to pygmy shrews, the fact that both Bangs (1979) and Brown (1967) reported lower shrew trapping success with conventional non-modified snap traps is noteworthy. Because of their small size, capture success of pygmy shrews would likely be affected. Sunken can traps provide higher capture success of shrews (Brown, 1967), and E. Bangs (pers. comm.) noted that success often increases after other species in the area are removed

Three other species of small mammals, water shrew (*Sorex palustris*), brown lemming (*Lemmus trimucronatus*), and meadow jumping mouse (*Zapus hudsonicus*), are potentially residents on the Kenai Peninsula, according to various range distribution maps (Hall and Kelson, 1959; Manville and Young, 1965). These accounts present no evidence of specimens collected on the Peninsula, and in light of the results of this study and the work of Bangs (1979), the presence of viable populations of these species remains suspect.

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